

ABSTRACT

**TRENCH-GATE SEMICONDUCTOR DEVICES, AND THEIR
MANUFACTURE**

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The trench-gate (11) of, for example, a cellular power MOSFET comprises doped poly-Si or other semiconductor material (11a) adjacent to the gate dielectric layer (17) adjacent to the channel-accommodating region (15) of the device. The gate (11) also comprises a sizeable silicide part (11b) that 10 reduces gate resistance. This silicide part (11b) protrudes upwardly from the trench (20) over a distance (z) typically larger than the width (w) of the trench (20), so forming an upstanding part (11b) of a metal silicide material between its top and sidewalls above the level of the body surface (10a). The gate dielectric layer (17) at least adjacent to the channel-accommodating region 15 (15) is protected from the metal silicide by at least the semiconductor part (11a) of the gate and by the protrusion (z) of the silicide part (11b) upwardly above the level of the body surface (10a). The height (z) of this silicide protrusion can be defined by a layer thickness of a mask (51,52; 510,520) with a window (51a, 510a) at which the trench (20) is etched. The silicide material 20 may be deposited or grown in situ by alloying.

(Figure 2)